

1 **WHAT IS CLAIMED IS:**

2 1. A hydrocarbon synthesis process comprising:

3 (a) forming a synthesis gas by reacting a combustible carbonaceous material and

4 a tail-gas with 1) steam and/or water and 2) oxygen or air or enriched air at an

5 elevated temperature in a gasification reactor;

6 (b) contacting the said synthesis gas with a hydrocarbon synthesis catalyst to form

7 liquid hydrocarbons and the tail-gas in hydrocarbon synthesis reactor;

8 (c) separating the resulting tail-gas and the liquid hydrocarbons; and

9 (d) recycling the tail-gas back the reactor.

10 2. The process of claim 1 comprising the additional step of removing carbon dioxide

11 from a fraction of the tail-gas and mixing the carbon dioxide-free tail-gas fraction

12 with the synthesis gas prior to contacting the synthesis gas with the hydrocarbon

13 synthesis catalyst.

14 3. The process of claim 1 comprising the additional step of combusting a fraction of

15 the tail-gas and generating power from said combusted fraction.

16 4. The process of claim 3 comprising the additional step of removing carbon dioxide

17 from a second fraction of the tail-gas and mixing the carbon dioxide-free tail-gas

18 second fraction with the synthesis gas prior to contacting the synthesis gas with

19 the hydrocarbon synthesis catalyst.

20 5. A method for consuming a tail-gas produced by reacting a synthesis gas with a

21 hydrocarbon synthesis catalyst comprising reacting the tail-gas and a combustible

22 carbonaceous material with steam and oxygen at an elevated temperature to form

23 the synthesis gas.

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- 1 6. The method of claim 5 comprising the additional step of removing carbon dioxide
- 2 from a fraction of the tail-gas and mixing the carbon dioxide-free tail-gas fraction
- 3 with the synthesis gas prior to reacting the synthesis gas with the hydrocarbon
- 4 synthesis catalyst.
- 5 7. The method of claim 5 comprising the additional step of combusting a fraction of
- 6 the tail-gas and generating power from said combusted fraction.
- 7 8. The method of claim 7 comprising the additional step of removing carbon dioxide
- 8 from a second fraction of the tail-gas and mixing the carbon dioxide-free tail-gas
- 9 second fraction with the synthesis gas prior to reacting the synthesis gas with the
- 10 hydrocarbon synthesis catalyst.